

EXCAVATIONS

PURPOSE

Safeguarding our workers and utilities is a continuous process that begins in the project planning and design phase and runs through documentation of as-built conditions. This chapter establishes a process to be followed by all divisions and sections when confronted with an excavation as a phase of work.

It is the intent of this chapter to provide guidance regarding actions needed to obtain an excavation permit prior to any activity that penetrates the soil and complementary procedures when operating under FESHM [7010](#) (Subcontractor Construction Safety Program) or FESHM [7020](#) (Subcontractor Safety- Other than Construction) and FESHM [2060](#) (Hazard Analysis for Fermilab Employees). This chapter is not a primer on how to do a safe excavation. Standards to follow when opening an excavation can be found in the Code of Federal Regulations 29CFR1926 Subpart P.

POLICY

Existing utility locations will be considered during the design phase of all proposed work that involves excavation. Where appropriate, designs will be modified to minimize interferences with existing utilities.

Procurement documents will clearly spell out Fermilab's expectations and requirements regarding excavation activities.

A completed permit is required before the start of any excavation activity and must be kept current when excavation is underway. The Facilities Engineering Services Section (FESS) will maintain a policy and procedure for issuing such permits. See FESS Standard Operating Procedure – Appendix A.

Lockout/Tagout (LOTO) procedures will be applied before excavating in the proximity of buried electrical cable and/or high-pressure gas lines. When deactivation of an existing electrical cable or high-pressure gas line in the area of an excavation is not possible, special planning and precautions must be taken and the Hazard Analysis (HA) must be approved by the Chief Operating Officer or designee.

As found and as-built, utility information will be gathered and stored in a retrievable system.

DEFINITIONS

Excavation- Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal. This includes directional drilling but does not include farm tillage operations.

Competent Person- One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Construction Coordinator (CC) - A person specifically assigned to oversee the work of a construction subcontract for conformance to the subcontract agreements/documents. Construction Coordinators serve as the primary construction point of contact between the Subcontractor and the Laboratory.

Electric Cable – any buried medium or high-voltage (120/208V system or higher) electrical cable whether direct buried, in conduit or in a reinforced concrete duct bank.

Design Coordinator – A person assigned the responsibility for assembly of complete design documents for the purpose of bidding and/or construction.

Fermi-JULIE – The system established in Fermilab to act on requests for locating buried utilities.

High-Pressure Gas Service – for purposes of this chapter is defined as any gas service at or above 100psi.

Potholing – Potholing is the practice of digging a test hole to expose underground utilities to determine the horizontal and vertical location of the utility. Potholing methods include:

- Hand Digging - Hand digging is the method of excavating a pothole by manual means with hand-held, non-mechanical equipment such as a shovel.
- Vacuum Excavation - Vacuum excavation consists of air or water pressure to break up the soil and a vacuum device to collect the spoil

Task Manager (TM) – A division/section-designated individual specifically assigned to oversee and direct a work activity. The Task Manager has primary responsibility for developing hazard assessments for the work, as prescribed in FESHM [2060](#) – Work Planning and Hazard Analysis. An approved TM list indicating individual experience

and competency to direct specific work activities can be found at <https://esh-docdb.fnal.gov:440/cgi-bin/ShowDocument?docid=75>

DUTIES AND RESPONSIBILITIES

Chief Operating Officer:

- When electrical cables and/or high-pressure gas service within 18" either side or crossing an excavation cannot be de-energized or depressurized, the Chief Operating Officer or his designee must sign the Excavation Hazard Analysis.

Division/Section Head:

- The Division/Section (D/S) Head is responsible for ensuring implementation of the requirements of this chapter for those construction activities managed by his/her staff.
- The D/S head is responsible for ensuring a qualified TM/CC is assigned.

Construction Coordinator/Task Manager (CC/TM):

- Submit Excavation Permit
- Submit as-built existing and/or new utility locations to the JULIE system.
- Assure competent person signs the excavation permit.
- Obtain Chief Operating Officer approval of HA if work near energized electrical cables or high-pressure gas lines is anticipated.
- Maintain supervision during live work activities

Design Coordinator:

- Verify proximity of excavation to accelerator enclosures and Solid Waste Management Units (SWMU's) as well as any special delineated areas.
- Incorporate as-built existing and/or new utility locations into the design drawings

STANDARDIZED COLORS FOR UTILITY LOCATORS

Paint, flags, or other marking schemes will use color as specified on the permit form.

PROCEDURES

Design Phase

When it is recognized that completion of a task will include excavation, the design team will identify existing underground utilities and incorporate reasonable accommodations into the design to minimize the likelihood of damage. The TM is responsible for any and all required engineering/design activities for T&M activities. Design Coordinators

are responsible for the engineering/ design activities associated with fixed-price construction work.

The design team will identify existing utilities using some or all of the following:

- Existing utility maps
- Previous design and as-built documents, including; accelerator enclosure clearance zones, radiation shielding assessments, and delineated special areas such as Solid Waste Management Unites (SWMU's)
- JULIE locating of utilities
- Test holes
- On-site physical review
- Corporate knowledge

The design team will incorporate all known utility information into design and construction drawings.

Contracts for projects including excavation activities shall require:

- An Excavation Permit before beginning any excavation.
- Field marking of the proposed excavation zones and maintenance of the JULIE locator markings.
- Notification to Fermilab of any damage to existing utilities.
- Submission of as-built drawings with utility line coordinates and elevations.

Construction Phase

Excavation Permit Process

1. The TM/CC will prepare an application for excavation permit identifying the area and depth (volume) of the excavation.
2. The TM or subcontractor shall mark the perimeter of the proposed excavation in the field using stakes and tape, white flags, or white paint.
3. An excavation permit will be issued when all locates marks are completed.
4. There may be times when it is known with certainty that the volume where an excavation is being considered is free of buried utilities. This certainty may have been reached by various means including corporate memory of construction of the facility, review of as built drawings or other means. The TM/CC may certify in writing that such area is devoid of buried utilities. This certification shall be attached to the HA and in effect will become a permit. This certification cannot be executed if the area in question is within 50 feet of a beamline or beamline enclosure.

Excavation Activities

1. The TM/CC shall review and sign the excavation permit with the subcontractor competent person.
2. The excavation permit & sketch must be available for reference at the excavation site.
3. During the excavation activity, the TM/CC will ensure that the existing and new utilities are documented and that the locating flags are removed after project completion.
4. The TM/CC is to conduct a preparatory meeting prior to the beginning of any excavating activity. Suggested agenda items include:
 - Review permits, HA, LOTO, disablements
 - Review shop drawings, materials on hand
 - Confirm JULIE markings are legible
 - Discuss routing of existing utilities and interferences
 - Confirm extent of excavations
 - Establish stop points (inspections)
 - Coordinate locates of as-found
 - Establish schedule for any further meetings

Suggested attendees include:

- TM/CC
 - Subcontractor superintendent
 - Excavating foreman
 - Machine operators
 - Subcontractor safety representative
 - ESH-SEP
5. Electrical cables and/or high-pressure gas service in the area of the excavation will be de-energized/depressurized and LOTO procedures implemented. When electrical cables and/or high-pressure gas service within 18" either side or crossing an excavation cannot be de-energized or depressurized, the Chief Operating Officer or his designee must sign the Excavation Hazard Analysis. Note: This requirement is waived when performing potholing using the vacuum excavation method.
 6. TM/CC presence is strongly recommended at the excavation site when:
 - a. Excavation activity first begins or enters a new phase.
 - b. Excavating within 5' of markings of energized electrical cable and/or high-pressure gas lines.
 - c. Excavating under existing utilities.

- d. Excavating across roadways
 - e. Pot-holing existing utilities.
7. Any incident involving damage to existing utilities shall be reported and investigated per the procedures in FESHM [3020](#), "Incident Investigation".

Closeout Phase

At the completion of each excavation activity, the TM/CC will submit as-found and as-built information with locations and depths of existing and installed utilities with the JULIE system.

EXCAVATIONS - EMERGENCY SITUATIONS

There may be instances where a system, utility or facility failure requires an immediate excavation to make repairs or where timeliness is of the utmost importance to preserve life or property. Applying the requirements of this chapter when an emergency arises may prove to be unfeasible when speed of repairs is essential. The task manager or construction coordinator shall take special care, given the circumstances, to identify high-risk utilities before proceeding.

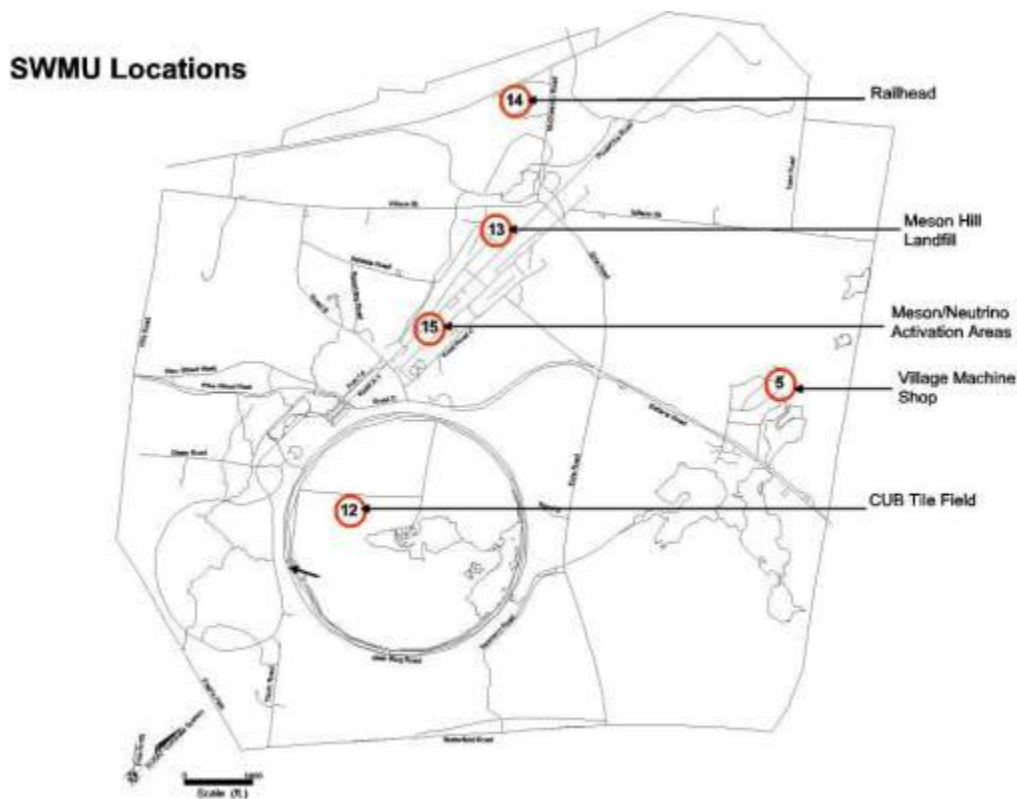
EXCAVATIONS- ON OR NEAR SOLID WASTE MANAGEMENT UNITS (SWMU'S)

There are five solid waste management units that introduce additional hazards to subcontractors and Fermilab employees when excavating near them. These areas are the Village Machine Shop, Meson Hill, the CUB Tile Field, the Railhead Storage area and the Meson & Neutrino Activation Areas. Exposure hazards are listed in Table-1 below for each unit. The location of the SWMU's can be gleaned from the site chart at the end of this chapter.

Table 1- Fermilab Solid Waste Management Units

SWMU No.	SWMU Name	Type of Contamination or Concern
5	Village Machine Shop	Trichloroethene, cis-1,2-Dichloroethene, 1,1-Dichloroethene
12	Central Utilities Building- Pipe and Clay Field	Tritium, Gross Alpha, Gross Beta, Chromium, Barium, Cadmium, Lead
13	Meson Hill Landfill	Demolition Waste, Soil, Clean Fill, Other Debris
14	Railhead Storage Area	Lead
15	Mesons & Neutrino Activation Areas	Accelerator produced radionuclides

CAUTION: Excavation in these areas require prior coordination with the ES&H Section and specific hazards associated with these units included in the Hazard Analysis.



APPENDIX A – FESS Standard Operating Procedure – J.U.L.I.E Procedure

SOP Identifier: 1.0

Version Number: 1

Effective Date: September 10, 2008

Subject Matter Expert: Carl Holmgren, JULIE Coordinator

I Applicability

This applies to all requests for utility locates submitted to FESS by others.

II Responsibilities

Requestor:

The excavation permit will be requested using the form found on the ES&H Web page. Attach a sketch or drawing that adequately identifies the area where the excavation will take place. Show the approximate location of the excavation and related information such as approximate width, length, and depth. A digital photo of the excavation area is helpful.

The requestor must mark the perimeter of the proposed excavation in the field using stakes or white flags or suitable paint.

The requestor must submit the excavation permit request no later than seven business days (14 business days for larger or multiple areas) prior to the proposed excavation. All responses for locates are subject to locator availability. The permit request package can be hand delivered, faxed, or mailed to the JULIE Coordinator. Allow time for delivery.

FESS JULIE Coordinator:

Coordinate the utility locates and issue permits.

III Procedures

Upon receiving a permit request, the JULIE Coordinator will contact the individuals listed as contacts for each utility who will complete the locating and marking process, and sign and date the permit. FESS utility contacts knowing with certainty they have no utilities buried in the excavation area(s) marked for locates may sign the permit (NR in column 5) without having to physically visit the site of the excavation. Locators must scan the entire marked excavation area(s) for utilities and place an X in the permit fifth column when markings are present. In lieu of actually signing the form the

acknowledgement can also be provided by email or phone message to the JULIE Coordinator, who will so indicate on the form.

The JULIE Coordinator will indicate locations of all utilities found on the permit sketch.

The JULIE Coordinator will sign and issue the completed permit with an expiration date seven (7) calendar days after completion of the last utility locate. If the excavator fails to start within the seven days, the TM/CC may extend the expiration date for additional seven-day increments once the integrity of the ground marks is verified. The JULIE Coordinator shall be notified of each extension.

All exposed existing utilities and newly installed utilities shall be surveyed and the information provided to and maintained by the JULIE Coordinator. Digital photography of exposed conditions is also recommended.

IV References

FESHM 7030

V Revision History

1	9/10/08	C. Holmgren	Original

VI Other